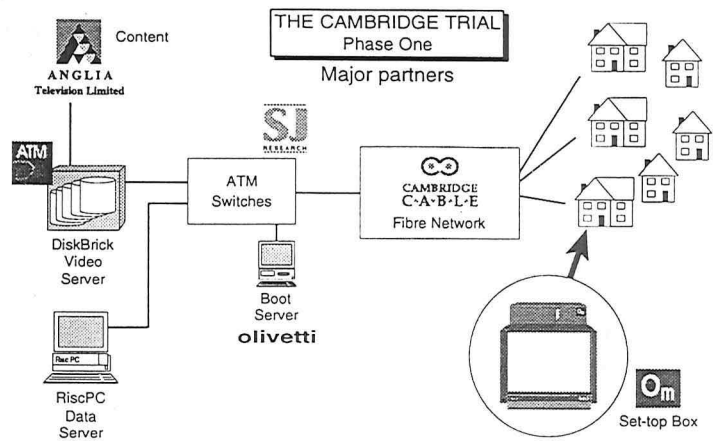# The Cambridge Interactive Television Trial

On September 30th 1994, Cambridge Cable launched a digital interactive TV (iTV) trial in Cambridge, England. The trial involves a consortium of companies lead by Online Media, part of the Acorn Computer Group, and includes Anglia TV, ATM Ltd, SJ Research, Denton Hall and ITN. In the trial users have their television connected to a new feature of the Cambridge Cable network by an intelligent, digital 'set-top box' designed by Online Media.

Interactive TV allows users to decide what they want to watch when they want to watch it. Users can choose from a selection of 'services' such as lists of films and documentaries, news and weather. They can also use the system for shopping, running educational programs and accessing games software. The information is stored on large machines called 'servers'. The digital techniques used offer good quality transmissions yet very effective use of the capacity of the Cambridge Cable network delivering the services to the homes.

The Cambridge Trial is one of the world's first digital interactive trials to be based on ATM (Asynchronous Transfer Mode) technology throughout, known as 'ATM to the home'. ATM is the emerging world standard for multimedia telecommunications, which allows video, voice, data and other services to be mixed at will on a single telecommunications network.

In its initial phases, the trial is intended to be a testbed for the technology involved. At the start, a handful of users will be connected but the numbers will rise as the months pass. By the end of 1995 the number of users should be into four figures. The trial will be a platform for the testing and development of networked multimedia systems and services.

Services

A range of services are offered on the Cambridge Trial and these will be extended as the trial continues.

Films and documentaries; playable at any time, on demand. Anglia TV will initially be providing material and other companies who own suitable information (the so called 'content owners') are preparing films for inclusion on the service. All video material is streamed to a specific user upon demand, allowing them to pause transmission, view in slow motion, fast forward or rewind; just as they have come to expect from their video cassette recorders. Now they have access to a large volume of material without having to acquire it for themselves, or get up from the armchair to change tapes.

Broadcast TV schedules; for the coming week will be listed. Users will be able to select a forthcoming programme and obtain a description of it. Anglia TV will be making their programme trailer video clips available so these can be viewed by users, upon demand.

News and weather; playable at any time, on demand. These services are to be provided by ITN and Anglia TV. Users will be able to watch say, News at Ten, starting at ten forty if they so wish. The service will also provide some cover for sports events.

For the initial trial the news will be updated daily by recording the news programmes from Anglia TV and ITN. Users can then choose when they want to watch the news and weather, rather than moulding their life around the broadcast TV schedule. In the future, it is proposed that the service will allow individual news items to be selected from a menu of "newsbytes" and it is possible to envisage the news service being personalised. As the system monitors what you typically watch, it could begin to prioritise topics that it knows are of interest to you so that these are presented on your personalised 'front page '.

Games; will be available from Graftgold, Cambridgeshire Software House, 4th Dimension, Gamesware and others. Users will be able to select titles from on-screen lists, which will then be loaded across the Cambridge Cable network to their set-top box. The game then runs in the user's equipment ensuring rapid, interactive play. Games writers are already working on networked games and these include a football game by Graftgold.

The ATM architecture permits fast communication between users, as well as between an individual user and the central server. The addition of human interaction and group or team dynamics adds a new dimension to games, which is likely to open up a new set of opportunities in the games market. Future options include fantasy adventures and games with learning or educational content.

Education and training; will be on offer through applications supplied by education specialists Sherston Software and Anglia TV. These applications will include titles commonly used in UK schools and others of general interest. Anglia TV are reworking CD-ROM titles which will then be made available across the network. They will now use full screen video support and users on the trial will be able to access these large databanks of knowledge without having to own a CD-ROM drive.

Home shopping; will initially be available in demonstration form with Woolworths and other retailers and mail order catalogue operators experimenting with the medium. Various catalogues are being compiled electronically and will be available for the users to browse and search for items of interest. As the trial develops so the running of these services could be distributed to the retailers themselves and include connection through to their ordering and financial systems.

The initial users of the trial will not be charged for the services. Later phases will explore different payment methods for the services on offer. Options, such as a service subscription, pay-per-play/view, pay for a week's access to a game and payment for connect time and transaction values, will all be investigated to test customers' reactions. Other services will gradually be implemented as the trial expands.

Technology

The technology to be used is all digital and, at least initially, is based entirely on British products developed by the consortium partners. Although the technology used is leading edge, the consortium has always focussed on producing cost effective solutions that can be directly scaled up to mass market use.

Cambridge Cable has been installing fibre optic cable around the city and the surrounding villages for several years. They have taken a structured approach to the installation and used upgradable equipment which allows them to start offering these new digital services without a massive change to their existing system.

The digital set-top box developed by Online Media benefits greatly from the technologies developed by Acorn over the last ten years. It is a flexible design, allowing it to work well with the digital network now available from Cambridge Cable, but other network architectures can also be supported and some will be tested as part of the Cambridge Trial.

The 2Mb/s bidirectional ATM communications model used in the trial has been developed by ATM Ltd and calls upon much of the experience of Cambridge University and the Olivetti Research Labs. The ATM switches, that are used to make the connection between users and the servers, have been manufactured by SJ Research to an initial design by ATM Ltd. SJ Research are also developing the next generation of ATM switch under licence from ATM Ltd that will be used in volume as the trial expands.

The data for the interactive services is held on large storage devices, the servers, initially sited at Online Media's premises. It is vitally important that the data for video and audio is streamed to the users at a constant and fixed rate. Users would not tolerate gaps and jumps in the playback! The servers used at this stage in the trial for such material are DiskBrick Media Servers from ATM Ltd. Each of these is designed to support up to 25 continuous video streams, and can store up to 15 feature films. As the number of users on the trial is increased so the number of DiskBricks will be increased to handle the demand.

The control systems and storage for the less time critical aspects of the services, are initially to be operated from Risc PCs from Acorn Computers. Server technology from other suppliers will be incorporated as the network expands and the servers will also be distributed across different sites around Cambridge. The ATM network architecture permits such a mix of different servers to be used, each can be optimised for different tasks and located to ease support of the services they provide.

Standards

It has been possible to launch the trial at this time as there is considerable material available that can utilise the Online Media set-top box. This itself is a result of the design being a derivative of Acorn's Risc PC computers. For the future for the interactive TV market it is vital that services are authored in a way that allows them to run over many types of network and work with the myriad of set-top devices that will emerge. Online Media and the other consortium members are committed to supporting industry standards and are actively involved in the world standards bodies defining these areas. An example of this is the cooperative development agreement between Oracle Inc and Online Media, working towards standards for network traffic and neutral application distribution formats.

The consortium is encouraging content owners to develop their services with the emerging high level authoring tools that support the diverse range of networks and the end user equipment that will exist in the future. Online Media is also identifying suitable low cost tools that will enable even small local companies to create services for iTV to promote their wares. In the future we look forward to seeing local hotels, restaurants, garages, estate agents and travel agents, amongst many others, using the capabilities of iTV.

The partners

Online Media was set up in July 1994 to develop products and services for the iTV market including, video on demand and networked multimedia. Online Media is currently selling a range of low cost, high capability set-top boxes for use in digital interactive television systems. Future offerings will include authoring systems, services and consultancy in service development and other areas. Online Media has announced cooperative development agreements with Oracle and Bell Northern Research, and is in discussion with a number of leading world organisations regarding further collaboration. Online Media is a member of the Acorn Computer Group, and has the full strategic backing of Acorn's parent, Olivetti.

Cambridge Cable offers state of the art cable television and telephony services to customers in the Cambridge area. Cambridge Cable, owned by Comcast and Singapore Telephone, is expanding rapidly and currently has coverage for over 67,000 homes and businesses.

SJ Research has been a major supplier of network systems to the UK education market for a number of years. The technology used in their network products is an implementation of ATM and this experience is now being put to good use in the development of low cost ATM switching for use on wide-area cable networks.

Anglia Television, a part of MAI, operates the independent television franchise for the East of England. Anglia also produces syndicated programmes for the UK independent network, including popular drama series such as The Chief, the world renowned Survival programmes and the top rated children's adventure game show Knightmare.

Advanced Telecommunications Modules Ltd supplies low cost multimedia networking products based on ATM (Asynchronous Transfer Mode). ATM is the emerging world standard for multimedia communication and the objective is to provide consumer affordable solutions for the business environment and the home. The ATM Ltd products, like the Online Media set-top box, are based on the low cost 32-bit RISC processor from ARM Ltd.

In addition to the formal partners in the Cambridge Trial, a number of other companies are associated with this project:

ARM (Advanced Risc Machines) Ltd was spun out of Acorn Computers in 1990, with investment from Apple Computer and VLSI Technology Inc. Through the activities of ARM Ltd the ARM 32-bit RISC processor originally developed by Acorn to power their home and educational computer designs is now being exploited much more widely. The ARM processor is ideally suited to the demands of the consumer market. It is a low cost design, small in size and has low power consumption, hence it can be used cost effectively in chips that also contain other circuits and it generates little heat.

Acorn Computer Group is the UK's leading supplier of IT to education, and manufacturer of the world's first RISC-based PC. Acorn's business was established in the early 80s, when the company supplied in excess of one million low cost personal computers under the BBC Microcomputer label to homes and schools. Known to be an innovative design centre and experienced in cost effective product development Acorn has twice won the Queen's Award for Technology. Acorn is currently 80% owned by Olivetti.

Olivetti is one of the world's leading IT companies, with offices in nearly 50 countries. Olivetti is active in developing, marketing and servicing office products, PCs and workstations, general purpose and specialised printers, mid/high range computer systems, networks, multimedia products and telecommunications. Olivetti has recently established a Telecommunications and Multimedia division to develop what is seen as a key strategic area for the future; Online Media is leading Olivetti Group's initiative in digital interactive television systems.

Denton Hall, a leading London-based media lawyer, is collaborating with the consortium to resolve issues of content rights and regulations, and to establish a commercial and regulatory framework for multimedia content that will give appropriate return and security to all involved. This is critical in making appropriate high quality content available for multimedia networks.

ITN (Independent Television News) is the UK's leading television news provider, providing national and international news coverage nation wide. ITN's News at Ten is the UK's top rated news programme.

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